

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



In re application of

Hiroiyuki KIYOKU, *et al.*

Continuation of Application No. 09/603,437

Group Art Unit: 1765

Confirmation No.: To be Assigned

Examiner: To be Assigned

Filed: November 6, 2001

For: NITRIDE SEMICONDUCTOR GROWTH METHOD, NITRIDE SEMICONDUCTOR
SUBSTRATE, AND NITRIDE SEMICONDUCTOR DEVICE

INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §§ 1.97 and 1.98

Commissioner for Patents
Washington, D.C. 20231

Sir:

In accordance with the duty of disclosure under 37 CFR §1.56, Applicants hereby notify the U.S. Patent and Trademark Office of the documents which are listed on the attached PTO-1449 forms which are all the references submitted in parent application No. 09/603,437. Applicants are not submitting duplicate copies of these references but requests that they be listed on the face of any patent granted on the above application. (*See* 37 CFR §1.98(d)).

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicants do not waive any right to take any action that would be appropriate to antedate or otherwise remove any listed document as a competent reference against the claims of the present application.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Edward F. Kenahan".

Edward F. Kenahan
Registration No. 28,962
David A. Klein
Registration No. 46,835

SUGHRUE MION, PLLC
2100 Pennsylvania Avenue, N.W.
Washington, D.C. 20037-3213
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

Date: November 8, 2001

Form PTO-1449 (Rev. 2-32)		U.S. Department of Commerce Patent & Trademark Office		Atty. Docket No. Q66212		Serial No.: Confirmation No.: To be Assigned	
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)				Applicant: Hiroyuki KIYOKU, <i>et al.</i>			
				Filing Date: 11/8/2001		Group: 1765	

CS97 U.S. PTO
 09/986332
 1/08/01

U.S. PATENT DOCUMENTS							
Examiner Initial		Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)
		4,482,422	11/13/1984	McGinn et al.	117	95	
		4,578,142	03/25/1986	Corboy et al.	117	89	
		4,908,074	03/13/1990	Hosoi et al.	148	33.2	
		5,239,188	08/24/1993	Takeuchi et al.	257	76	
		5,247,533	09/21/1993	Okazaki et al.	372	45	
		5,290,393	03/01/1994	Nakamura et al.	438	509	
		5,364,815	11/15/1994	Osada	438	489	
		5,679,152	10/21/1997	Tischler et al.	117	97	
		5,709,745	01/20/1998	Larkin et al.	117	96	
		5,727,008	03/10/1998	Koga et al.	372	43	
		5,764,673	06/09/1998	Kawazu et al.	372	45	
		5,766,695	06/16/1998	Nguyen et al.	427	553	
		5,773,369	06/30/1998	Hu et al.	438	746	
		5,789,265	08/04/1998	Nitta et al.	438	22	
		5,880,485	03/09/1999	Marx et al.	257	94	
		6,051,849	04/18/2000	Davis et al.	257	103	02/27/1998
		2001/0007242 A1	07/12/2001	Davis et al.	117	104	
		2001/0009167 A1	07/26/2001	Davis et al.	148	33	

FOREIGN PATENT DOCUMENTS							
		Document	Date	Country	Class	Sub-class	Translation Yes/No
		7-273367 A	10/20/1999	JAPAN	H01L	33/00	
		5-343741 A	12/24/1993	JAPAN	H01L	33/00	
		5-55631 A	03/05/1993	JAPAN	H01L	33/00	
		8-64791 A	03/08/1996	JAPAN	H01L	27/12	
		7-201745 A	08/04/1995	JAPAN	H01L	021/205	
		WO 97/11518	03/27/1997	PCT	H01S	3/18	Yes-EP 0 852 416 A1
		0 852 416 A1	07/08/1998	EP	H01S	3/18	
		WO 99/44224	09/02/1999	PCT	H01L	21/20	

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)	
	International Search Report, PCT/US98/01640, July 14, 1998
	Defendant Nichia America Corporation's Motion for Partial Summary Judgment, <i>North Carolina State University and Cree, Inc., v. Nichia Corporation and Nichia America Corporation</i> , No: 5:00-CV-703-F(2), U.S. District Court for the Eastern District of North Carolina Southern Division, Dec. 11, 2000
	International Search Report, PCT/US99/04346, June 9, 1999
	Lester et al, "High Dislocation Densities in High Efficiency GaN-Based Light-Emitting Diodes", <i>Appl. Phys. Lett.</i> , 66 , 1995, pp. 1249-1251
	Nakamura, Shuji and Gerhard Fasol, <i>The Blue Laser Diode: GaN Based Light Emitters and Lasers</i> , Berlin: Springer, 1997, pp. 282-304

EXAMINER:	DATE CONSIDERED:
-----------	------------------

EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication.

Form PTO-1449 (Rev. 2-32)		U.S. Department of Commerce Patent & Trademark Office		Atty. Docket No. Q66212		Serial No.: Confirmation No.: To be Assigned	
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)				Applicant: Hiroyuki KIYOKU, <i>et al.</i>			
				Filing Date: 11/8/2001		Group: 1765	
U.S. PATENT DOCUMENTS							
Examiner Initial		Document Number	Date	Name	Class	Sub-Class	Filing Date (if appropriate)
		RE 34,861	02/14/1995	Davis et al.	117	86	
		4,946,547	08/07/1990	Palmour et al.	117	97	
		4,912,064	03/27/1990	Kong et al.	438	507	
		4,865,685	09/12/1989	Palmour	438	718	
		4,522,661	06/11/1985	Morrison et al.	148	33.2	
		5,815,520	09/29/1998	Furushima	372	45	
		5,786,606	07/28/1998	Nishio et al.	257	103	
		5,760,426	06/02/1998	Marx et al.	257	190	
		5,549,747	08/27/1996	Bozler et al.	117	43	
		5,397,736	03/14/1995	Bauser et al.	117	56	
		5,389,571	02/14/1995	Takeuchi et al.	117	89	
		5,122,845	06/16/1992	Manabe et al.	257	76	
		4,876,210	10/24/1989	Barnett et al.	117	58	
		4,651,407	03/24/1987	Bencuya	438	193	
		5,877,070	03/02/1999	Goesele et al.	438	458	
		5,710,057	01/20/1998	Kenney	438	406	
		4,127,792	11/28/1978	Nakata	313	500	
FOREIGN PATENT DOCUMENTS							
		Document	Date	Country	Class	Sub-class	Translation Yes/No
		0 551 721 A2	07/21/1993	EP	H01L	21/20	
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)							
		Zheleva et al., <i>Dislocation Density Reduction Via Lateral Epitaxy in Selectively Grown GaN Structures</i> , Appl. Phys. Lett. Vol. 71, No. 17, October 27, 1997, pp. 2472-2474					
		Doverspike et al., <i>The Effect of GaN and AlN Buffer Layers on GaN Film Properties Grown on Both C-Plane and A-Plane Sapphire</i> , Journal of Electronic Materials, Vol. 24, No. 4, 1995, pp. 269-273					
		Kuznia et al., <i>Influence of Buffer Layers on the Deposition of High Quality Single Crystal GaN Over Sapphire Substrates</i> , J. Appl. Phys., Vol. 73, No. 9, May 1, 1993, pp. 4700-4702					
		Watanabe et al., <i>The Growth of Single Crystalline GaN on a Si Substrate Using AlN As An Intermediate Layer</i> , Journal of Crystal Growth, Vol. 128, 1993, pp. 391-396					
		Chen et al., <i>Silicon-on-Insulator: Why, How, and When</i> , AIP Conference Proceedings, Vol. 167, No. 1, September 15, 1988, pp. 310-319					
		Amano et al., <i>Metalorganic Vapor Phase Epitaxial Growth of a High Quality GaN Film Using an AlN Buffer Layer</i> , Applied Physics Letters, Vol. 48, No. 5, February 3, 1986, pp. 353-355					
		Yoshida et al., <i>Improvements on the Electrical and Luminescent Properties of Reactive Molecular Beam Epitaxially Grown GaN Films by Using AlN-Coated Sapphire Substrates</i> , Applied Physics Letters, Vol. 42, No. 5, March 1, 1983, pp. 427-429					
		Nakamura, <i>GaN Growth Using GaN Buffer Layer</i> , Japanese Journal of Applied Physics, Vol. 30, No. 10A, October 1991, pp. L1705-L1707					
EXAMINER:				DATE CONSIDERED:			
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication.							

Form PTO-1449 (Rev. 2-32)		U.S. Department of Commerce Patent & Trademark Office		Atty. Docket No. Q66212	Serial No.: Confirmation No.: To be Assigned
INFORMATION DISCLOSURE STATEMENT (Use several sheets if necessary)				Applicant: Hiroyuki KIYOKU, <i>et al.</i>	
				Filing Date: 11/8/2001	Group: 1765
OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)					
Examiner Initial		Document			
		International Search Report, PCT/US99/12967, October 18, 1999			
		Kapolnek et al., "Anisotropic Epitaxial Lateral Growth in GaN Selective Area Epitaxy", Appl. Phys. Lett. 71(9), 1 September 1997, pp. 1204-1206			
		Usui et al., "Thick GaN Epitaxial Growth With Low Dislocation Density by Hydride Vapor Phase Epitaxy", Jpn. J. Appl. Phys., Vol. 36, Part 2, No. 7B, 15 July 1997, pp. 899-902			
		Nam et al., "Growth of GaN and Al _{0.2} Ga _{0.8} N on Patterned Substrates Via Organometallic Vapor Phase Epitaxy", Jpn. J. Appl. Phys., Vol. 36, Part 2, No. 5A, 1 May 1997, pp. 532-535			
		Nam et al., "Selective Growth of GaN and Al _{0.2} Ga _{0.8} N on GaN/AlN/6H-SiC(0001) Multilayer Substrates Via Organometallic Vapor Phase Epitaxy", Proceedings MRS, December 1996, 6 pp.			
		Kapolnek et al., "Selective Area Epitaxy of GaN for Electron Field Emission Devices", Journal of Crystal Growth, 5451, 1996, pp.1-4			
		Weeks et al., "GaN Thin Films Deposited Via Organometallic Vapor Phase Epitaxy on α (6H)-SiC(0001) Using High-Temperature Monocrystalline AlN Buffer Layers", Appl. Phys. Lett. 67(3), 17 July 1995, pp. 401-403			
		Kato et al., "Selective Growth of Wurtzite GaN and Al _x Ga _{1-x} N on GaN/Sapphire Substrates by Metalorganic Vapor Phase Epitaxy", Journal of Crystal Growth, 144, 1994, pp. 133-140			
		Yamaguchi et al., "Lateral Supply Mechanisms in Selective Metalorganic Chemical Vapor Deposition", Jpn. Appl. Phys., Vol. 32 (1993), pp. 1523-1527			
		Nakamura et al., InGaN/GaN/AlGaIn-Based Laser Diodes With Modulation-Doped Strained-Layer Superlattices, Jpn. J. Appl. Phys., vol. 36, Dec. 1, 1997, pp. L1568-L1571			
		Linthicum et al., Pendeoepitaxy of Gallium Nitride Thin Films, Applied Physics Letters, Vol. 75, No. 2, July 12, 1999, pp. 196-198			
		Zheleva et al., Pendeo-Epitaxy: A New Approach for Lateral Growth of Gallium Nitride Films, Journal of Electronic Materials, Vol. 28, No. 4, February 1999, pp. L5-L8			
		Zheleva et al., Pendeo-Epitaxy-A New Approach for Lateral Growth of GaN Structures, MRS Internet Journal of Nitride Semiconductor Research, 1999, Online!, Vol., 4S1, No. G3.38, November 30, 1998-December 4, 1998			
		Nakamura et al., InGaN/GaN/AlGaIn-Based Laser Diodes Grown on GaN Substrates With a Fundamental Transverse Mode, Jpn. J. Appl. Phys., Vol. 37, September 15, 1998, pp. L1020-L1022			
		Marchand et al., Microstructure of GaN Laterally Overgrown by Metalorganic Chemical Vapor Deposition, Applied Physics Letters, Vol. 73, No. 6, August 10, 1998, pp. 747-749			
		Sakai et al., Transmission Electron Microscopy of Defects in GaN Films Formed by Epitaxial Lateral Overgrowth, Vol. 73, No. 4, July 27, 1998, pp. 481-483			
		Nakamura et al., High-Power, Long-Lifetime InGaN/GaN/AlGaIn-Based Laser Diodes Grown on Pure GaN Substrates, Jpn. J. Appl. Phys., Vol. 37, March 15, 1998, pp. L309-L312			
		Nam et al., Lateral Epitaxial Overgrowth of GaN Films on SiO ₂ Areas Via Metalorganic Vapor Phase Epitaxy, Journal of Electronic Materials, Vol. 27, No. 4, 1998, pp. 233-237			
		Wu et al., Growth and Characterization of SiC Films on Large-Area Si Wafers by APCVD-Temperature Dependence, Materials Science Forum, Vols. 264-268, 1998, pp. 179-182			
		Nam et al., Lateral Epitaxy of Low Defect Density GaN Layers Via Organometallic Vapor Phase Epitaxy, Appl. Phys. Lett., Vol. 71, No. 18, November 3, 1997, pp. 2638-2640			
EXAMINER:		DATE CONSIDERED:			
EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication.					